

Death certification: is correct formulation of cause of death related to seniority or experience?

ABSTRACT—We looked at a series of death certificates completed by various grades of hospital clinicians, general practitioners (GPs) and pathologists. Specific error types were defined and identified in each group. In hospital it is still the pre-registration house officer who completes most of the death certificates. Senior hospital doctors make more errors than their juniors while GPs and pathologists make fewest errors. Even amongst pathologists 11% of certificates recorded no adequate underlying cause of death, 85.7% failed to record organisms identified and 76.7% failed to record the site or histological type of tumours. This agrees with other studies that show that inaccuracies in death certificates arise from inadequate formulation of cause of death and failure to record relevant information. It reveals that little heed has been paid to the recommendation in the joint report of the Royal College of Physicians and Pathologists that senior doctors should be more involved in certification—the frequency of errors in this group suggests that it might not, in any case, lead to a great improvement. The number of errors made by GPs and pathologists suggests that even practitioners with clinical experience and regular exposure to certification frequently make errors. The reasons for this are discussed and possible solutions proposed.

During the early part of the last decade the attention of the Royal College of Physicians and Pathologists was turned towards perceived inadequacies in certification practice, culminating in their joint report [1] and the report of the Medical Services Study Group of the Royal College of Physicians on death certification [2]. Both these reports recommended that death certificates in hospital be completed by senior staff and that this task should not be delegated to pre-registration house officers. The extent to which this recommendation has been adopted has not been measured but neither has the foundation of the recommendation itself: namely, that death certificates are completed to a higher standard by senior doctors than by house officers. It has been pointed out that the World Health Organisation (WHO) system of certification is not straightforward to use, especially in complex clinical situations where multiple pathology and complex pathological sequences may be present [3], but it has not been shown that any broad group of practitioners

is adept at using it in practice. This is an important consideration, given that the major solution recommended is increased undergraduate and postgraduate education in certification practice [1]—instruction that would need to be economical with time and which certainly could not match the exposure to the subject that a pathologist would have during training. However, the competence even of pathologists, with the benefit of considerable training and close supervision in formulating the cause of death, is untested. The aim of this study was to assess the quality of certification within different groups of practitioners. First, whether pathologists using the WHO system on a day-to-day basis, who could thus be expected to do so with a low error rate, lived up to this expectation. Second, whether there really is a difference in competence in completing certificates between junior and senior hospital doctors.

Recommended practice

Strictly, the medical practitioner in attendance during the last illness is required to sign a medical certificate of cause of death, but it is usual practice for the doctor to refrain from issuing such a certificate if the death has been reported to the coroner. Death certificates issued in hospital are thus from cases which have not been reported to the coroner or those in which the coroner has declined jurisdiction.

The statement of cause of death is used internationally and is divided into two parts: in Part I, the chain of events leading to death is described from an 'underlying' disease or injury through to the final event or immediate cause of death; in Part II, any condition unrelated to the conditions described in Part I which may have contributed towards, or hastened, death is stated. Detailed advice on completing this statement of cause of death is given both within the books of death certificates [4] and by the WHO [5]. On a separate page within the books of death certificates is printed a list of points under the title 'Reminders' (reproduced below).

Reminders

The points which you are asked to remember when completing a certificate are summarised below:

- 1 Are all the conditions satisfied for you to certify death? (*detailed earlier within the book of certificates*)
- 2 Check that you have indicated the underlying cause of death clearly. This should be the condition on

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MED A 20 COUNTERFOIL <i>For use of Medical Practitioner who should complete in all cases</i>	BIRTHS AND DEATHS REGISTRATION ACT 1953 <small>(Form prescribed by Registration of Births and Deaths Regulations 1987)</small> MEDICAL CERTIFICATE OF CAUSE OF DEATH <small>For use only by a Registered Medical Practitioner WHO HAS BEEN IN ATTENDANCE during the deceased's last illness, and to be delivered by him forthwith to the Registrar of Births and Deaths.</small>	Registrar to enter No. of Death Entry																	
Name of deceased Date of death as stated to me day of Age as stated to me Place of death Last seen alive by me day of																			
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;"> 1 The certified cause of death takes account of information obtained from post-mortem. 2 Information from post-mortem may be available later 3 Post mortem not being held. 4 I have reported this death to the Coroner for further action. (See overleaf) </td> <td style="width: 10%; border: none; text-align: center; vertical-align: middle;"> } Please ring appropriate digit(s) and letter </td> <td style="width: 40%; border: none;"> a Seen after death by me. b Seen after death by another medical practitioner but not by me c Not seen after death by a medical practitioner. </td> </tr> </table>			1 The certified cause of death takes account of information obtained from post-mortem. 2 Information from post-mortem may be available later 3 Post mortem not being held. 4 I have reported this death to the Coroner for further action. (See overleaf)	} Please ring appropriate digit(s) and letter	a Seen after death by me. b Seen after death by another medical practitioner but not by me c Not seen after death by a medical practitioner.														
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Name of deceased } Date of death Age Place of death Last seen alive by me } Post-mortem* 1 2 3 4 Coroner Whether seen after death* a b c Cause of death I (a) (b) (c) II Employment? <input type="checkbox"/> Please tick where applicable	<table style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="text-align: center; padding: 5px;">CAUSE OF DEATH</th> </tr> <tr> <td colspan="2" style="text-align: center; padding: 5px;"><small>The condition thought to be the 'Underlying Cause of Death' should appear in the lowest completed line of</small></td> </tr> <tr> <td style="width: 80%; padding: 5px;">I (a) Disease or condition directly leading to death†</td> <td style="width: 20%; padding: 5px;">.....</td> </tr> <tr> <td style="padding: 5px;">(b) Other disease or condition, if any, leading to: I(a)</td> <td style="padding: 5px;">.....</td> </tr> <tr> <td style="padding: 5px;">(c) Other disease or condition, if any, leading to: I(b)</td> <td style="padding: 5px;">.....</td> </tr> <tr> <td style="padding: 5px;">II Other significant conditions CONTRIBUTING TO THE DEATH but not related to the disease or condition causing it</td> <td style="padding: 5px;">.....</td> </tr> </table>	CAUSE OF DEATH		<small>The condition thought to be the 'Underlying Cause of Death' should appear in the lowest completed line of</small>		I (a) Disease or condition directly leading to death†	(b) Other disease or condition, if any, leading to: I(a)	(c) Other disease or condition, if any, leading to: I(b)	II Other significant conditions CONTRIBUTING TO THE DEATH but not related to the disease or condition causing it	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;"><small>These particulars not to be entered in death register</small></td> </tr> <tr> <td style="padding: 5px;">Approximate interval between onset and death</td> </tr> <tr> <td style="padding: 5px;">.....</td> </tr> <tr> <td style="padding: 5px;">.....</td> </tr> <tr> <td style="padding: 5px;">.....</td> </tr> </table>	<small>These particulars not to be entered in death register</small>	Approximate interval between onset and death
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The death might have been due to or contributed to by the employment followed at some time by the deceased <input type="checkbox"/> Please tick where applicable <small>† This does not mean the mode of dying, such as heart failure, asphyxia, asthenia, etc.: it means the disease, injury, or complication which caused death.</small> I hereby certify that I was in medical attendance during the above named deceased's last illness, and that the particulars and cause of death above written are true to the best of my knowledge and belief. Signature Qualifications as registered by General Medical Council Residence Date For deaths in hospital: Please give the name of the consultant responsible for the above-named as a patient																			

Fig. 1. Example of a death certificate.

- the last completed line of Part I of the certificate. If any conditions in Part I do not belong to the main causal sequence, move them to Part II.
- 3 Put in time intervals (where known).
- 4 If you record a symptom, include also the underlying cause.
- 5 If you record an infection, state also the site, the causal organism, whether acute or chronic, and the duration of the disease.
- 6 When recording a tumour, state the histology, whether malignant or benign, etc, the anatomical site, whether primary or secondary and, in the latter case, the site of the primary and date of removal if known.
- 7 Age should be recorded in completed years or, if under a year, in months, weeks, days, hours or minutes, as appropriate.
- 8 Distress may be caused to relatives or superfluous enquiries instigated as a result of the use of indefinite or ambiguous terminology. For example, 'cerebrovascular accident' carries an implication to lay persons of violence. An alternative term such as 'stroke' might be used if no more precise term is available.

- 9 Avoid completing a certificate with the mode of dying as the only entry.
- 10 The registrar is required to notify certain deaths to the coroner; it saves the relatives trouble and anxiety if you immediately notify such deaths and explain why to the relatives.

Methods

A consecutive series of death certificate counterfoils was examined to determine the proportion of certificates completed by various grades of staff in a major teaching hospital. Subsequently, further samples were collected at random from the records of three consecutive calendar years consisting of 300 certificates completed by house officers, 100 by senior house officers (SHOs) ('junior' doctors) and 100 by either registrars, senior registrars or consultants ('senior' doctors). Doctors of registrar grade or above were regarded as 'senior' doctors because as a group they generally hold a postgraduate qualification. A further sample of 200 certificates completed by general practitioners (GPs) during the same time period relating to deaths in the same locality was examined at the local registry office. We also examined 200 causes of death formulated by pathologists following post mortem examination;

these were cases both for the coroner and performed as 'consent' post mortems. They do not represent death certificates as such, but the causes are formulated in the same way. The following errors in the formulation of causes of death were identified (examples of the groups are given in Table 1):

1 *No underlying cause of death.* This was subdivided into certificates.

- recording an unqualified mode of death alone;
- showing evidence of confusion—either relating to principles of certification or to pathological sequences;
- where uncertainty of the diagnosis was stated; and
- where the cause given, while amounting to more than a mode of death, did not clearly state the underlying cause.

2 *Relevant details absent.* We placed in this category certificates without a record of the histology or site of tumours, or of the organisms isolated in cases of infectious disease. In a separate subgroup were put those certificates which failed to record other information deemed relevant and whose inclusion is recommended by the 'notes to practitioners' [4] or by the WHO guidelines [5].

The incidence of errors in certificate formulation in the different groups was established.

Results

In hospital, the majority of deaths were certified by junior medical staff, in particular by the house officer. The consecutive series of death certificates showed that of 615 certificates examined over a six-month period 75.9% were completed by the house officer, 15.9% by the SHO, 4.1% by the registrar, 1.5% by the senior registrar and 2.6% by the consultant.

The incidence of the various errors is summarised in Table 2, which shows that 14.9% of death certificates (or pathologists' causes) showed no adequate underlying cause of death and that the best performance by hospital doctors in this respect was by house officers. While there was no significant difference in the number of lines completed on death certificates amongst clinicians, it was noted that pathologists tended to complete more lines in Part I (Table 2) and to use Part II more frequently (pathologist use of part II: 39%; clinician use: 18%).

Discussion

The ability of doctors satisfactorily to complete the medical certificate of cause of death has been questioned in a number of studies. They have documented failures in the understanding of the principles of death certification [6]; failure to be acquainted with the instructions regarding certification given to medi-

Table 1. Examples of errors in the formulation of the cause of death.

1. <i>Underlying cause of death not stated or not clear</i>	
Unqualified mode:	Ia Acute renal failure Ia Chronic renal failure II Brain failure Ia GI haemorrhage
Confused:	Ia MI Ib IHD Ic Cholecystitis II Dementia Ia Disseminated carcinoma of prostate Ib Small bowel fistula (operated)
Inadequate:	Ia Congestive cardiac failure Ib Failed heart transplant II Chronic renal failure Ia Bronchopneumonia Ib Immobility Ia Pseudomembranous colitis
Uncertain:	Ia Acute hepatic failure of unknown cause Ia ?PE II Myelofibrosis
2. <i>Relevant details absent</i>	
	Ia Carcinomatosis Ia Septicaemia Ib Bowel tumour Ia Pneumonia Ia Septicaemia Ia CVA Ia Renal failure Ib Obstruction II Cardiac failure

cal practitioners in the books of certificates [3]; failure to include all relevant details [7]; and confused formulation of pathological sequences [6,8]. It has been suggested that as undergraduates spend less time on medico-legal topics than in the past this has decreased the level of competence [9]. A logical solution would thus be to increase the amount of teaching both at undergraduate and postgraduate level [1,6]. However, in one study, when competence was measured before and after a programme of postgraduate education in certification practice, there was no significant improvement [10], and another study, aimed to correct inadequate certificates through contact with the certifying doctor, also failed to elicit a worthwhile response [11]. A further suggestion has been to encourage senior staff to complete the death certificates themselves or to supervise closely fully registered practitioners [1,2].

This study suggests that the formulation of death certificates would not appear to be a skill associated with clinical experience alone. The performance of GPs—being the least prone to error of the clinicians assessed—suggests that it is the combination of clinical experience and regular exposure to the task of certification that is important. It might be argued that deaths in general practice are more straightforward—in pathological terms—than deaths in

Table 2. Errors in formulating the cause of death.

	All (%)	HO (%)	SHO (%)	R/SR/Cons (%)	GP (%)	Pathologist (%)
<i>Total no. certificates studied</i>	900	300	100	100	200	200
Underlying cause not stated or not clear						
Unqualified mode	54 (6.0)	15 (5.0)	9 (9.0)	10 (10.0)	10 (5.0)	10 (5.0)
Confusion	60 (6.7)	17 (5.7)	15 (15.0)	10 (10.0)	8 (4.0)	10 (5.0)
Inadequate	15 (1.7)	8 (2.7)	2 (2.0)	1 (1.0)	2 (1.0)	2 (1.0)
Uncertain	5 (0.6)	2 (0.7)	2 (2.0)	0 (0.0)	1 (0.5)	0 (0.0)
Total	134 (14.9)	42 (14.0)	28 (28.0)	21 (21.0)	21 (10.5)	22 (11.0)
<i>No. certificates stating infection</i>	195	83	22	18	51	21
Organism not stated or lack of organisms not stated	180 (92.3)	78 (94.0)	21 (95.5)	16 (88.9)	47 (92.1)	18 (85.7)
<i>No. certificates stating malignancy</i>	160	64	12	16	38	30
Site/histology not stated or lack of such not stated	117 (73.1)	41 (64.1)	9 (75.0)	12 (75.0)	32 (84.2)	23 (76.7)
Other relevant details absent	86 (9.6)	43 (14.3)	13 (13)	10 (10)	15 (7.5)	5 (2.5)
Mean no. of lines completed in Part I of death certificate	NA	2.06	2.33	2.26	2.25	3.01
Use of Part II	18					39

hospital, but this is not borne out by examination of the certificates which contained comparable amounts of information for each group of clinicians, as evidenced by the number of 'lines' completed.

It is reasonable to suggest that senior doctors might improve their performance through practice, but it is also pertinent to ask why, given previous recommendations, senior staff have not been more involved in certification. Is a lack of interest at senior level—perhaps with a failure to understand the importance of these certificates—of signal importance? This would explain not only the seniors' less than optimal performance but also the perception amongst junior staff that correct certification is not important and can be left in the hands of the most junior member of the clinical team.

It is not surprising that pathologists should make the fewest errors in virtually every category since they have the most exposure to medico-legal matters concerned with death and are well used to listing causes of death. It is relevant to mention some points of dissimilarity between the causes of death given by pathologists and the groups of clinicians. First, there is a tendency for cases undergoing post mortems to be more complicated than deaths which are 'signed up'.

This is supported by the greater number of 'lines' filled in on certificates completed by pathologists and may increase the errors due to the greater complexity of the pathological processes described. Secondly, some relevant details, such as histology and microbiology, are not included on the formal reports but are made available to the Office of Population Censuses and Surveys later. Despite these factors, it is surprising that so many errors were still apparent and that these errors were broadly similar to those made by clinicians apart from a markedly increased tendency (not formally assessed) amongst pathologists to list irrelevant diseases, such as gallstones or prostatic hyperplasia, in Part II (an error warned against in the 'notes to medical practitioners').

The fact that no group consistently performed to a high standard implies that one underlying problem may be that the WHO format of death certification is not user-friendly, imposing a rigid framework within which the statement of cause of death must be placed. This is adequate when the cause of death is simple but is difficult to use when complex and interacting pathological processes, often complicated by therapeutic procedures, are present leading to confused sequences and other semantic errors.

The use of the WHO system is so widespread that to replace it would be impractical even if a better system could be devised. Additional teaching at both the undergraduate and postgraduate level must be a sensible route to improved practice, and perhaps the Royal Colleges should give thought to examining aspects of the law relating to medical practice in their diplomas. Such an emphasis might encourage senior doctors to become more involved in certification and lead to a heightened perception of the importance of death certification. The standard of certification might be even higher if all death certificates were reviewed by a medically qualified 'screener', as occurs in Finland. This person, through inspection of the death certificate and, where indicated, review of the clinical record and discussion with the certifying doctor, could ensure that the certificate was completed with adequate detail and made medical sense. Whether a pathologist or clinician would be best suited to such a role and whether such a system should be part of medical audit within the individual hospital or arranged on a regional basis through independent practitioners, is open to debate. Such scrutiny would prevent inadequate certificates passing through the system and help ensure that appropriate referrals were made to the coroner—a job currently performed with limited success by the Registrar of Births and Deaths [6,12]. It would have good repercussions in terms of mortality statistics, the value of death certificates to the clinician, and accurate reporting of deaths to the coroner.

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